

Coastal Impact Assistance Program (CIAP)

Project Nomination

Administrative Information

Date Submitted: May 22, 2006

Project Title: Fritchie Marsh Stormwater Diversion Project

Requesting Agency: St. Tammany Parish Government

Contact Information:

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Project Summary

Project Location: St. Tammany Parish, Louisiana

Project Type: Conservation, restoration and protection of coastal area, including wetland.

Project Duration: It is anticipated that the project will last approximately 4 years. The first year will consist of a stormwater wetland restoration evaluation including any necessary hydraulic and hydrologic modeling, and conceptual engineering design. Engineering design of the chosen alternative will occur in year two, and construction of the project(s) required to divert additional stormwater to Fritchie Marsh will occur in years three and four of the project.

Total CIAP Funds Requested: \$14,350,000

Parish CIAP Funds Proposed: \$2,500,000

State CIAP Funds Requested: \$11,850,000

Project Summary: The Fritchie Marsh contains 6,291 acres of intermediate and brackish marsh and is located approximately 3 miles southeast of Slidell, Louisiana, near the north shore of Lake Pontchartrain in St. Tammany Parish. The marsh is bounded by U.S. Highway 90 to the south and east, Louisiana Highway 433 to the west, and U.S. Highway 190 and additional marshland to the north.

Many acres of emergent marsh within Fritchie Marsh had been converted to open water, with the greatest loss occurring in the northern portions of the marsh. The loss reflects a pattern of marsh deterioration from north to south due to a reduction of freshwater and sediment input. Man-made changes occurred that likely attributed to this loss, such as the construction of the perimeter highways, which isolated the marsh from the West Pearl River Basin and restricted inflow of fresh water, nutrients, and sediment. In addition, the project area receives saltwater input from Lake Pontchartrain through the W-14 canal and Little Lagoon during high tides and strong southerly winds. As a result, Fritchie Marsh has been converted from a predominantly fresh marsh to a predominantly brackish marsh.

To counteract this deterioration, the Louisiana Department of Natural Resources (LDNR) completed a marsh restoration project in 2001, which consisted of the following:

- A weir in the W-14 canal to divert part of the freshwater outflow from Slidell to the interior of the northern portions of the marsh.

- One mile of Salt Bayou was dredged west of U.S. Highway 90 to allow for increased water exchange from the West Pearl River.
- A 72-inch culvert was installed next to an existing culvert at U.S. Highway 90 to allow for increased flow from the West Pearl River into the project area.

Prior to Hurricane Katrina, the project had resulted in some restoration of the marsh. However, Hurricane Katrina reversed any progress made in marshland restoration and Fritchie Marsh is again predominantly open water. In order to accelerate marsh restoration and coastal protection, a new project to supplement previous restoration activities is necessary.

The initial phase of the project will consist of determining methods of routing additional stormwater to Fritchie Marsh using hydrologic and hydraulic analysis, performing a stormwater water quality analysis, and determining Fritchie Marsh's ability to assimilate additional stormwater discharge and also to determine the benefits of this assimilation. Once it is determined that there is a benefit to the marsh from additional stormwater inputs, an evaluation will be performed to determine the most cost effective methods to introduce additional stormwater to the marsh. For example, in addition to the W-14 canal, which runs along the western portions of the Fritchie Marsh, the W-15 canal carries stormwater away from the City of Slidell, Louisiana (City) and discharges into the W-14 canal upstream of the existing weir structure installed by LDNR in 2001. The W-15 canal is also interconnected with the W-14 canal within the City. One potential alternative would be to evaluate changes to this interconnection to allow more stormwater into the W-14 and W-15 canals, and therefore, allow more stormwater to enter the Fritchie Marsh and provide needed fresh water and nutrients. Other potential alternatives include enhancements to or dredging of other inputs into the marsh such as Salt Bayou and Bloom Bayou, or perhaps altering the discharge location of the W-14 canal. The existing weir structure could also be evaluated and optimized, and if necessary, a better means of distributing stormwater throughout the marsh developed. This project will compliment benefits provided by the previous LDNR project and a proposed project to discharge treated wastewater effluent to the Fritchie Marsh as an additional means of wetland restoration.

In the first year of the project a stormwater wetland restoration evaluation will be performed including any necessary hydraulic and hydrologic modeling, and conceptual engineering design. The stormwater wetland evaluation will be performed in conjunction with the wastewater to wetlands Use Attainability Analysis (UAA), which is being performed to evaluate the ability of Fritchie Marsh to assimilate a treated wastewater effluent discharge. The wastewater to wetlands UAA is already funded by U.S. Environmental Protection Agency (EPA) grants through the Lake Pontchartrain Basin Foundation as part of the St. Tammany Parish's Wastewater Consolidation Program. The scope of work, consistent with the requirements of the Louisiana Department of Environmental Quality (LDEQ), is attached to this project nomination. The wastewater to wetlands UAA provides the ecological evaluation necessary to verify the suitability of a candidate site for wetland assimilation. Municipalities in Louisiana considering wetland assimilation are required to conduct a wastewater to wetlands UAA as part of the LDEQ permitting process, as well as the U.S. Army Corps of Engineers' (USACE) and the LDNR wetland permitting process. The purpose of the wastewater to wetlands UAA is to characterize the targeted assimilation site ecosystem by establishing baseline ecological conditions and assessing its assimilative capacity. It is against the baseline

conditions that monitoring results in the permit can be compared to determine any changes in the system. The wastewater to wetlands UAA characterizes the site with respect to hydrology, soils, water chemistry, and vegetation. In addition, the wastewater to wetlands UAA also presents information about planning and geomorphology, as well as the criteria and regulatory issues by which the wetland treatment system will be judged.

In conjunction with the wastewater to wetlands UAA, a hydrologic and hydraulic analysis of the Fritchie Marsh basin will be performed to determine the quantity of stormwater available to divert to the marsh and in turn to determine and evaluate alternatives for routing of stormwater to the marsh. The hydraulic and hydrologic analysis will also include a stormwater water quality analysis. In general, this portion of the work will consist of the following:

- Data Collection and Evaluation
- Define Fritchie Marsh Basin Boundaries
- Setup Hydrologic and Hydraulic Model
- Run Design Storm Simulations
- Run Water Quality Simulations
- Develop/Evaluate Alternatives

Once an alternative to provide additional stormwater to the Fritchie Marsh is selected, the engineering design phase of the project will begin, followed by construction of the restoration project.

The cost to perform the stormwater wetland restoration evaluation, including the hydrologic and hydraulic modeling, development and selection of the appropriate alternative to most cost effectively restore Fritchie Marsh, and the conceptual engineering design of the selected alternative, is estimated to be \$350,000. The cost to perform detailed engineering design of the restoration project is estimated to be \$1,000,000. The cost to construct the Fritchie Marsh restoration project is estimated to be \$13,000,000.

Goals and Objectives: The stormwater wetland restoration evaluation is critical for permitting the proposed additional stormwater diversion to the Fritchie Marsh. The ultimate objective of the first year of this project is to verify the viability of discharging additional stormwater to the marsh as a means of restoration, develop and evaluate alternatives to introduce additional stormwater in the marsh while maintaining or improving upstream drainage performance, and select the appropriate alternative to position the St. Tammany Parish (in terms of both permitting and establishment of technical criteria) for the design and construction phases of the planned stormwater diversion/wetland restoration project.

Project Justification: The proposed CIAP project nomination is justifiable for a number of reasons. For example, the project would contribute to the restoration of a deteriorating coastal ecosystem. The Fritchie Marsh has been deteriorating for many years due to lack of freshwater input, sediment input, and saltwater intrusion. The addition of stormwater to deteriorated wetlands accelerates their restoration due to the additional nutrients and sediment that the stormwater carries into the wetland.

The project would strengthen storm surge protection for the City of Slidell, Louisiana and surrounding areas. Coastal wetlands diminish storm surge by decreasing winds and wave action because marsh vegetation acts as a source of friction as the storm surge passes over them. Deteriorated wetlands and open water allow the surge to move towards land unimpeded.

The project would serve to restore damage to the Fritchie Marsh caused in part by Hurricane Katrina. Aerial photography of the marsh from before and after Hurricane Katrina show the devastating effects of the storm. Pre-Katrina images show the improvements to the marsh resulting from the previous LDNR restoration project; whereas, post-Katrina images show that the storm transformed the marsh back to predominantly open water. This restoration project is necessary to accelerate the restoration of Fritchie Marsh after Hurricane Katrina.

The project will improve the performance of the local drainage system. To provide additional stormwater to Fritchie Marsh, it will be necessary to eliminate bottlenecks in upstream portions of the drainage system. Alleviating these bottlenecks will further reduce flooding during large rainfall events.

The project will make beneficial use of stormwater as a fresh water resource. As fresh water sources become scarcer, it is becoming necessary to view stormwater and wastewater effluents as water resources that may be put to some beneficial use (e.g., wetlands restoration).

The project is also consistent with the goals of Coast 2050 and the Lake Pontchartrain Basin Foundation Comprehensive Management Plan. Upon implementation, the completed project will address coastal enhancement and restoration issues within the Fritchie Marsh. Carefully designed wetland assimilation projects improve coastal wetland habitats and restore deteriorating wetlands.

Use Attainability Analysis (UAA) Scope of Work

St. Tammany Parish Wastewater Consolidation Program

Phase 5 – Use Attainability Analysis for East Slidell WWMA

Work Plan

Background

The need for a consolidated regional sewerage system was established in Phase 1 of the program. A detailed engineering and financial plan for the implementation of the regional system, as well as a strategy for including private, community and individual treatment systems in the regional plan were developed in Phase 2. Phase 2 also included an awareness campaign highlighted by a public service announcement on local television. The Phase 3 effort focused on the development of service and collection alternatives for high-density unsewered subdivisions through the formation of 17 franchise areas, and further developed the roles of existing private utilities in the comprehensive plan. The Phase 4 project moves the consolidation program to its implementation, through the development of franchise agreements for centralized sewer collection and drinking water distribution systems in priority areas.

The previous phases of the Wastewater Consolidation Program and this proposed Phase 5 project directly address several Lake Pontchartrain Basin Comprehensive Management Plan (CMP) recommendations:

- Planning and construction of regional sewerage systems
- Better maintenance and education for the owners/operators of small community/business wastewater treatments plants and individual home wastewater treatments plants
- Wetlands enhancement through wetlands assimilation of treated wastewater
- Expanding public education to reduce pollution at its source

Objective

The specific objective of the Phase 5 project is to evaluate the suitability of using wetlands to assimilate secondarily treated wastewater from the unincorporated areas in St. Tammany Parish surrounding the City of Slidell through a Use Attainability Analysis (UAA). The results of this work will establish the design criteria for the new regional treatment facility that will serve the East Slidell Wastewater Management Area.

Phase 5 Tasks

Phase 4 is composed of three main tasks that will be pursued simultaneously during the estimated year-long duration of the project. The tasks will largely be undertaken by the St. Tammany Parish Government's consultant team headed by the firm of Camp Dresser & McKee Inc. (CDM). The CDM team's specific tasks are described herein.

Task 1: Preliminary Feasibility Analysis

Analysis of Potential Sites

The wetlands will be characterized as to their ecological condition and capacity to assimilate wastewater. Preliminary loading rate analysis will be carried out. Potential locations for treatment facilities will be investigated if appropriate. Land ownership of the sites will be ascertained to determine if there are impediments to use of the wetlands.

Coordination with regulatory agencies

Coordination with regulatory agencies, including include the Louisiana Department of Environmental Quality (LDEQ), the Louisiana Department of Natural Resources (LDNR), the US Army Corps of Engineers (USACE), and the US Environmental Protection Agency (EPA).

Preliminary Engineering Analysis

A preliminary analysis of engineering will be performed to determine technical requirements and preliminary cost estimates.

Task 1 Deliverable

A report which provides a preliminary characterization of the wetland systems in question, their suitability for wastewater assimilation, an analysis of loading and assimilation capabilities of the wetland, a preliminary engineering and cost analysis, landowner constraints, and other appropriate information.

Task 1 Estimated Completion Date

Three months from receipt of the executed agreement from the University of New Orleans Research and Technology Foundation (UNO R&TF).

Task 2: Baseline Ecological Characterization

The following outline for a monitoring study is based on data needs to obtain an understanding of the baseline ecological conditions of the proposed receiving, to provide information for permit purposes, and to develop baseline conditions for the monitoring plan. The proposed work is divided into several stages designed to specifically provide information for the baseline ecological conditions report, to meet the needs for preparing a permit application to the appropriate regulatory agency for discharge of secondarily treated wastewater, and to design a wetlands monitoring plan. The different work stages are as follows:

1. A yearlong intensive monitoring field investigation of the site.
2. Preparation of a report on baseline ecological conditions.
3. Preparation of background information on the area and on environmental compliance.

Field Investigation

The field investigation will be carried out to gather information for the UAA. The following parameters will be measured:

- Vegetation composition and productivity

- Sediment analysis
- Water chemistry and loading rate analysis
- Hydrology

These parameters will be measured in the following areas:

- Potential treatment areas in the wetlands, which will receive, direct discharge of the effluent.
- A control area which will not be affected by the discharge. This will be located near the treatment area.

Task 2 Deliverable

Draft and final reports summarizing the methodology and findings, and establishing the baseline ecological conditions

Task 2 Estimated Completion Date

Draft Report: Six months from the completion of Task 1.

Final Report: Twelve months from the completion of Task 1.

Task 3: Preliminary Design Recommendations

A preliminary design indicating recommended wetland treatment boundaries, inlet, and outlet locations and monitoring suggestions will be prepared based on the findings of the study. Experience from other similar projects will be included in the evaluation.

Task 3 Deliverables

Draft Engineering Report, for the purpose of review and permit application.

Final Engineering Report.

Task 3 Estimated Completion Date

Draft Engineering Report – six months after completion of the Task 2 Draft Report.

Final Engineering Report – six months after acceptance of the Draft Engineering Report.

Task 4: Quality Assurance Project Plan

Prior to any field data collection, a Quality Assurance Plan (QAPP) shall be developed and submitted to USEPA for review, comment and approval. The four groups of elements are as follows:

Group A – Project Management

Organizational chart, list of managers and their responsibilities.

Group B - Data Generation and Acquisition

The individual elements to be included in the QAPP:

- B1 Sampling Process Design
- B2 Sampling Methods
- B3 Sample Handling and Custody
- B4 Analytical Methods
- B5 Quality Control
- B6 Instrument/Equipment Testing, Inspection, and Maintenance
- B7 Instrument/Equipment Calibration and Frequency
- B8 Inspection/Acceptance of Supplies and Consumables
- B9 Non-direct Measurements
- B10 Data Management

Group C - Assessment and Oversight

- C1 Assessments and Response Actions
- C2 Reports to Management

Group D - Data Validation and Usability

- D1 Data Review, Verification, and Validation
- D2 Verification and Validation Methods
- D3 Reconciliation with User Requirements

Task 4 Deliverables

Approved Quality Assurance Project Plan

Task 4 Estimated Completion Date

Two months from receipt of the executed agreement from UNO R&TF.

Task 5: Monitoring

Monitoring is required to establish the various aspects of the ecology and chemistry of the wastewater effluent and the receiving wetland. The overall objective is to carry out measurements to specifically meet the requirements of the permit. The details of the proposed monitoring are given below. The proposed work will be based on the results of the field investigations and monitoring of the site described in the report on the baseline ecological conditions.

The overall objective is to carry out measurements to specifically meet the monitoring requirements of the permit. Measurements of hydrology, vegetation, water and soil chemistry, will be carried out. Samples taken will be processed and results will be analyzed. Quarterly monitoring reports and a final report will be prepared in order to ascertain that the specific criteria for protection of the receiving wetland is protected. Meetings will be held with LDEQ as necessary to ensure smooth functioning of the project.

1. Hydrology - analysis of the hydrology of the forested wetland will be based on water level recorder data, surface and below surface water levels measured in the study plots,

and precipitation data. For monitoring the effluent discharge, we will take water samples along the path of flow of the effluent and in the control area.

2. Water Quality - Dissolved Oxygen (DO), Water Temperature, pH, and Total Dissolved Solids (TDS). Total Suspended Solids (TSS) and Biological Oxygen Demand (BOD) will be measured.
3. Nutrient Analysis - Surface water samples will be. Total nitrogen and total phosphorus samples will be collected. Dissolved nutrients will be analyzed using an autoanalyzer.
4. ICAP Analysis - Samples will be collected from the effluent pipe, surface water in the treatment and control areas, and from the wetland outlet.
5. Statistical Analyses - To compare the treatment and control areas, one factor ANOVA's will be run on each parameter using data from those months for which there were an equal number of samples.
6. Soils - One sediment core will be taken from both the sampling areas. Parameters measured will include: pH, electrical conductivity (EC), and Mg, Pb, Cd, Cr, Cu, Zn, Fe, Ni, Ag, Se, NH₃-N, NO₂-N, NO₃-N, PO₄, TKN, and TP.
7. Vegetation - Within each of the treatment and control areas, all trees with a diameter at breast height (dbh) greater than 3.2 cm) will be tagged and the species recorded. The percent cover for herbaceous vegetation will be determined by a modified line-intercept technique patterned after that proposed by DS&N, Inc. (1988). The relative importance of each major tree species in both the treatment and control areas is based on the density (total number), dominance (basal area), and frequency of occurrence in each of the plots.
8. Productivity - Litterfall will be collected monthly in each plot using five 0.25 m² boxes with 1 mm mesh bottoms. The composition, percent cover and biomass of emergent herbaceous vegetation will also be measured in the treatment and control sites.
9. Nutrient and Metals Analysis of Green Leaves and Litter - Green leaf samples will be collected during the last year of the monitoring from the major species in the treatment and control areas, once during March through May and once during September through November.

Task 5 Deliverables

Monitoring Plan , Quarterly Reports and Final Report

Task 5 Estimated Completion Date

The Monitoring Plan shall be submitted six months after acceptance of the draft baseline ecological report and the draft engineering report.